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EXAMINER	
LE, TOAN M	
ART UNIT	**PAPER NUMBER**
2863	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/518,062	Applicant(s) DUNCAN ET AL.	
	Examiner Toan M. Le	Art Unit 2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 25 April 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 63-125 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 63-125 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 16 December 2004 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 12/16/04.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 63-68, 71-74, 76, 79-86, 88-93, 95-101, 103-109, 111-113, 115-117, and 120-125 are rejected under 35 U.S.C. 102(b) as being anticipated by Fox (US Patent No. 6,191,587).

Referring to claim 63, Fox discloses a data acquisition system for gathering geophysical data, said system comprising:

at least one data acquisition unit (figure 4) connectable to a plurality of sensors 12 (figures 1-2) and being arranged, during use, to simultaneously gather geophysical data from the sensors, the at least one data acquisition unit comprising time referencing means 64 (figure 4) arranged to generate time reference data usable to control the time at which samples of geophysical data are taken (col. 7, lines 56-64; col. 8, lines 6-21 and lines 30-40; col. 9, lines 4-18); and

means for calculating spatial derivatives between simultaneous samples associated with adjacent sensors connected, during use, to the at least one data acquisition unit (col. 12, lines 29-38).

As to claim 64, Fox discloses a data acquisition system for gathering geophysical data, wherein the time referencing means comprises a GPS receiver 64 (figure 4).

Referring to claim 65, Fox discloses a data acquisition system for gathering geophysical data, wherein the time referencing means comprises an accurate oscillator (68 (figure 4).

As to claim 66, Fox discloses a data acquisition system for gathering geophysical data, wherein the accurate oscillator comprises a precision oven controlled crystal oscillator 68 (figure 4), and the time referencing means further comprises a counter arranged to count signals generated by the crystal oscillator (col. 7, lines 56-64; col. 10, lines 64-67 to col. 11, lines 1-14; figure 4).

Referring to claim 67, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit is arranged to receive synchronisation signals useable to adjust a frequency of the oscillator and thereby adjust the times at which samples of geophysical data are taken so that the times at which samples of geophysical data are taken are synchronised with the times at which samples of geophysical data are taken in other data acquisition units (col. 10, lines 64-67 to col. 11, lines 1-14).

As to claim 68, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit is arranged to receive and store programs for subsequent execution (col. 10, lines 26-44; figure 4).

Referring to claim 71, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit is arranged to calculate an average sample value for a plurality of consecutive samples taken during a data gathering operation carried out as part of a geophysical survey so as to produce a representative sample for the consecutive samples (col. 11, lines 42-56).

As to claim 72, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit is arranged to estimate the amount of interference present at a survey site (col. 11, lines 42-56).

Referring to claim 73, Fox discloses a data acquisition system for gathering geophysical data, wherein the amount of interference present is estimated by carrying out a first data gathering operation with an incident magnetic field of a first polarity so as to produce a first response, carrying out a second data gathering operation with an incident magnetic field of a second polarity so as to produce a second response, and calculating a sum of the first and second responses so as to cause the first and second responses to cancel out (col. 11, lines 42-56).

As to claim 74, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit is arranged to filter gathered geophysical data so as to remove periodic interference (col. 4, lines 40-55; col. 11, lines 29-41).

Referring to claim 76, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit is arranged to generate at least one quality control indicator for use in assessing a quality of the gathered geophysical survey data (col. 9, lines 50-59).

As to claim 79, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit is arranged to downward extrapolate gathered geophysical survey data so as to enhance detail of a target located below a surface of a survey area (col. 10, lines 5-14).

Referring to claim 80, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit is connectable to an energy source, the data acquisition

unit is arranged to gather energy source output data from the energy source, and the time referencing means is arranged so as to sample the gathered energy source output data (col. 8, lines 30-40).

As to claim 81, Fox discloses a data acquisition system for gathering geophysical data, wherein the system is arranged to correct for variations in magnitude of the energy source output during a geophysical survey (col. 11, lines 42-56).

Referring to claim 82, Fox discloses a data acquisition system for gathering geophysical data, wherein the system is arranged to correct for a variation in magnitude of the gathered geophysical data caused by a variation in power supplied to the energy source (col. 8, lines 6-21).

As to claim 83, Fox discloses a data acquisition system for gathering geophysical data, further comprising at least one interface arranged to facilitate transfer of geophysical data and/or programs to or from the data acquisition unit (figure 4).

Referring to claim 84, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit comprises a multi-tasking operating system (figures 3-4 and 5B).

As to claim 85, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit is arranged to facilitate transfer of geophysical data from the data acquisition unit during a geophysical survey (col. 8, lines 45-56; col. 10, lines 15-25).

Referring to claim 86, Fox discloses a data acquisition system for gathering geophysical data, wherein the interface comprises at least one of an infrared interface, a serial interface, and a network interface (col. 7, lines 56-67).

As to claim 88, Fox discloses a data acquisition system for gathering geophysical data, further comprising display means arranged to provide information indicative of operation of the data acquisition unit to an operator (figure 3).

Referring to claim 89, Fox discloses a data acquisition system for gathering geophysical data, wherein the data acquisition unit includes the means for calculating spatial derivatives (col. 12, lines 29-38).

As to claim 90, Fox discloses a data acquisition system for gathering geophysical data, wherein the means for calculating spatial derivatives is separate from the data acquisition unit (col. 12, lines 29-38).

Referring to claim 91, Fox discloses a data acquisition system for gathering geophysical data, further including a portable computing device, the portable computing device including the means for calculating spatial derivatives (col. 9, lines 29-41; col. 12, lines 29-38; col. 13, lines 43-47).

As to claim 92, Fox discloses a data acquisition system for gathering geophysical data, comprising a plurality of data acquisition units (figures 1-2).

Referring to claim 93, Fox discloses a data acquisition system for gathering geophysical data, further comprising:

at least one reference data acquisition unit, each reference data acquisition unit being connectable to at least one reference sensor and being arranged, during use, to gather geophysical data from the at least one reference sensor, and to take samples of the geophysical data gathered from the at least one reference sensor;

wherein the means for calculating spatial derivatives between samples associated with adjacent sensors is arranged to calculate first spatial derivatives between at least some of the sensors and the at least one reference sensor connected to the reference data acquisition unit during a first data gathering operation when the sensors are disposed in a first location, to calculate second spatial derivatives between at least some of the sensors and the at least one reference sensor connected to the reference data acquisition unit during a second data gathering operation when the sensors are disposed in a second location, and to calculate a difference spatial derivative between the first and second spatial derivatives, each said difference spatial derivative being indicative of a spatial derivative between a sensor disposed in a first location and a sensor disposed in a second location (col. 8, lines 58-67 to col. 9, lines 1-3; col. 9, lines 23-28 and lines 51-60; col. 12, lines 29-38).

As to claim 95, Fox discloses a data acquisition system for gathering geophysical data, further comprising an energy source arranged to generate and direct energy towards a sub-surface volume so as to cause a geophysical response and thereby cause generation of the geophysical signals (col. 11, lines 58-67 to col. 12, lines 1-17).

Referring to claim 96, Fox discloses a data acquisition system for gathering geophysical data, wherein the energy source includes a transmitter and a transmitter loop (col. 7, lines 56-64; figure 4).

As to claim 97, Fox discloses a data acquisition system for gathering geophysical data, further comprising an energy source control unit connectable to the energy source and arranged to gather output data from the energy source, the energy source control unit comprising time referencing means arranged to generate time reference data usable to control the time at which

samples of the energy source output data are taken and to associate the energy source output data with the time reference data (col. 8, lines 6-21 and 30-40; figure 4).

Referring to claim 98, Fox discloses a data acquisition system for gathering geophysical data, wherein the energy source control unit is a transmitter control unit arranged to control a transmitter so as to energize a transmitter loop in accordance with a predetermined frequency (col. 8, lines 6-21).

As to claim 99, Fox discloses a data acquisition system for gathering geophysical data, wherein the energy source control unit includes the same components as the data acquisition unit so that the transmitter control unit is capable of carrying out the functions of the data acquisition unit and vice versa (col. 8, lines 6-21; figure 4).

Referring to claim 100, Fox discloses a method of acquiring geophysical data, said method including the steps of:

providing at least one data acquisition unit arranged to simultaneously gather geophysical data from a plurality of sensors connected in use to the at least one data acquisition unit(col. 7, lines 56-64);

connecting a plurality of sensors to the at least one data acquisition unit (figures 1-2 and 4);

generating at the data acquisition unit time reference data usable to control the time at which gathering of samples of geophysical data are taken; and

calculating spatial derivatives between simultaneous samples associated with adjacent sensors connected during use to the at least one data acquisition unit (col. 8, lines 6-21 and lines 30-40; col. 9, lines 4-18).

As to claim 101, Fox discloses a method of acquiring geophysical data, further comprising the steps of:.

providing at least one reference data acquisition unit arranged, during use, to gather geophysical data from at least one reference sensor;

connecting each of the at least one reference data acquisition unit to at least one of the at least one reference sensors (col. 8, lines 58-67 to col. 9, lines 1-3);

calculating first spatial derivatives between at least some of the sensors connected to the data acquisition units and the at least one reference sensor connected to the at least one reference data acquisition unit during a first data gathering operation when the sensors are disposed in a first location;

calculating second spatial derivatives between at least some of the sensors connected to the data acquisition units and the at least one reference sensor connected to the at least one reference data acquisition unit during a second data gathering operation when the sensors are disposed in a second location; and

calculating a difference spatial derivative between the first and second spatial derivatives, each said difference spatial derivative being indicative of a spatial derivative between the first location and a sensor the second location (col. 9, lines 23-28 and lines 51-60; col. 12, lines 29-38).

As to claim 103, Fox discloses a method of acquiring geophysical data, wherein the step of generating time reference data comprises the step of providing a GPS receiver 64 (figure 4).

Referring to claim 104, Fox discloses a method of acquiring geophysical data, wherein the step of generating time reference data comprises the step of providing an oscillator 68 (figure 4).

As to claim 105, Fox discloses a method of acquiring geophysical data, wherein the oscillator comprises a precision oven controlled crystal oscillator, and the step of generating time reference data further comprises the step of providing a counter arranged to count signals generated by the crystal oscillator (col. 7, lines 56-64; col. 10, lines 64-67 to col. 11, lines 1-14; figure 4).

Referring to claim 106, Fox discloses a method of acquiring geophysical data, further comprising the step of facilitating reception at the data acquisition unit of synchronisation signals useable by the processing means to adjust a frequency of the oscillator and thereby adjust the time at which samples of geophysical data are taken so as to synchronise the time at which samples of geophysical data are taken with the time at which samples of geophysical data are taken in other data acquisition units (col. 10, lines 64-67 to col. 11, lines 1-14).

As to claim 107, Fox discloses a method of acquiring geophysical data, further comprising the steps of receiving and storing programs at the data acquisition unit for subsequent execution by the processing means (col. 10, lines 26-44; figure 4).

Referring to claim 108, Fox discloses a method of acquiring geophysical data, further comprising the step of calculating an average sample value for a plurality of corresponding repeat sample values when a plurality of data gathering operations are carried out as part of a geophysical survey so as to reduce an effect of interference on the samples and reduce the quantity of data (col. 11, lines 42-56).

As to claim 109, Fox discloses a method of acquiring geophysical data, further comprising the step of comparing repeat sample values and discarding samples which differ by a predetermined amount from a majority of the repeat sample values (col. 8, lines 6-21).

As to claim 111, Fox discloses a method of acquiring geophysical data, further comprising the step of estimating the amount of interference present at a survey site (col. 11, lines 42-56).

Referring to claim 112, Fox discloses a method of acquiring geophysical data, wherein the amount of interference present is estimated by carrying out a first data gathering operation with an incident magnetic field of a first polarity so as to produce a first response, carrying out a second data gathering operation with an incident magnetic field of a second polarity so as to produce a second response, and calculating the sum of the first and second responses so as to cause the first and second responses to cancel out (col. 11, lines 42-56).

As to claim 113, Fox discloses a method of acquiring geophysical data, further comprising the step of filtering gathered geophysical data so as to remove periodic interference (col. 4, lines 40-55; col. 11, lines 29-41).

Referring to claim 115, Fox discloses a method of acquiring geophysical data, further comprising the step of correcting for variations in magnitude of an energy source during a geophysical survey (col. 11, lines 42-56).

As to claim 116, Fox discloses a method of acquiring geophysical data, wherein the step of correcting for variations in magnitude includes the step of correcting for a variation in magnitude of the energy source caused by a variation in power supplied to the energy source (col. 8, lines 6-21).

Referring to claim 117, Fox discloses a method of acquiring geophysical data, further comprising the step of generating at least one quality control indicator for use in assessing the quality of the gathered geophysical survey data (col. 9, lines 50-59).

As to claim 120, Fox discloses a method of acquiring geophysical data, further comprising the step of downward extrapolating gathered geophysical survey data so as to enhance detail of a target located below a surface of a survey area (col. 10, lines 5-14).

Referring to claim 121, Fox discloses a method of acquiring geophysical data, wherein the method further comprises the step of facilitating transfer of processed geophysical data and/or programs to or from the data acquisition unit (figure 4).

As to claim 122, Fox discloses a method of acquiring geophysical data, further comprising the step of providing each data acquisition unit with display means for providing information indicative of operation of the data acquisition unit to an operator (figure 3).

Referring to claim 123, Fox discloses a system for gathering geophysical data, wherein the system is arranged to correct variations in the energy source using the reference data acquisition unit and associated reference sensor (col. 8, lines 58-67 to col. 9, lines 1-3 and lines 51-60).

As to claim 124, Fox discloses a method of acquiring geophysical data, further comprising the step of correcting variations in the energy source using the reference data acquisition unit and associated reference sensor (col. 8, lines 58-67 to col. 9, lines 1-3 and lines 51-60).

Referring to claim 125, Fox discloses a data acquisition system for gathering geophysical data, said system comprising:

at least one data acquisition unit connectable to a plurality of sensors and being arranged, during use, to simultaneously gather geophysical data from the sensors, the at least one data acquisition unit comprising time referencing means arranged to generate time reference data usable to control a time at which samples of geophysical data are taken (col. 7, lines 56-64; col. 8, lines 6-21 and lines 30-40; col. 9, lines 4-18); and

a processor arranged to calculate spatial derivatives between simultaneous samples associated with adjacent sensors connected during use to the at least one data acquisition unit (col. 8, lines 6-21 and lines 30-40; col. 12, lines 29-38).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 69-70, 75, 77-78, 87, 94, 102, 110, 114, and 118-119 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fox as applied to claims 63-68, 71-74, 76, 79-86, 88-93, 95-101, 103-109, 111-113, 115-117, and 120-124 above, and further in view of Matteucci et al. (US Patent No. 6,801,473).

Referring to claims 69-70, 75, 77-78, 87, 94, 102, 110, 114, and 118-119, Fox does not teach the data acquisition unit is arranged to calculate an average sample value for a plurality of corresponding repeat samples values/compare repeat samples and to discard samples which differ by a predetermined amount from a majority of the repeat samples/convert the gathered geophysical data into frequency domain using Fourier transform analysis/calculate a standard

deviation value for the gathered geophysical survey data/adjust a level of gain based on an assessment of a magnitude of the gathered geophysical survey data/store a correction coefficients for each sensor connected to the data acquisition unit used to correct for variations in sensor sensitivity/calculate an integral of the spatial derivative.

Matteucci et al. disclose a data acquisition system/method for gathering geophysical data wherein the data acquisition unit is arranged to calculate an average sample value for a plurality of corresponding repeat samples values (col. 3, lines 57-67; col. 4, lines 1-5)/compare repeat samples and to discard samples which differ by a predetermined amount from a majority of the repeat samples (col. 18, lines 64-67 to col. 19, lines 1-6; col. 19, lines 38-53)/convert the gathered geophysical data into frequency domain using Fourier transform analysis (col. 4, lines 61-67; col. 5, lines 1-27; col. 10, lines 9-25)/calculate a standard deviation value for the gathered geophysical survey data (col. 4, lines 6-21; col. 18, lines 53-59)/adjust a level of gain based on an assessment of a magnitude of the gathered geophysical survey data (col. 4, lines 29-51 and lines 61-67; col. 5, lines 1-12)/store a correction coefficients for each sensor connected to the data acquisition unit used to correct for variations in sensor sensitivity (col. 12, lines 55-67 to col. 13 to col. 14, lines 1-31)/calculate an integral of the spatial derivative (col. 12, lines 55-67 to col. 13 to col. 14, lines 1-31).

Accordingly, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have applied the teaching of Matteucci et al. reference into the reference of Fox removing noise from gathering geophysical data to enhance spatial resolutions in imaging rock formations.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toan M. Le whose telephone number is (571) 272-2276. The examiner can normally be reached on Monday through Friday from 9:00 A.M. to 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Toan Le

January 6, 2006

BRYAN BUI
PRIMARY EXAMINER